farther north numerous ruins of villages were found, and the Eskimo had names for every point and island. Thus it appears that the distance between the North Greenlanders and the inhabitants of Smith Sound is not so great as was generally assumed, and it becomes very probable that intercourse between these tribes in a limited degree existed not very long ago, or maybe still exists.

SCIENTIFIC NEWS IN WASHINGTON.

Collectors and Collections of Jewels and Precious Stones: an Interesting Chapter by George F. Kunz. — A Steel 'Vacuum' Balloon: the Absurd Proposition of a Scientific Crank indorsed by a Committee of Congress. — Death of Prof. E. B. Elliott: a Great Loss to Science. The Tape-Worm in Sheep.

Collections of Jewels and Precious Stones.

THE following is an extract from a paper lately prepared by Mr. George F. Kunz of Tiffany & Co., New York, which will be used as the basis of a report on precious stones, which will appear in the volume on 'Mineral Resources of the United States,' to be issued by the United States Geological Survey a few months hence: —

"A regrettable dispersion of jewels and precious stones took place on May 12 and 14, 1886, when the famous collection formed by the late Henry Philip Hope, and exhibited at the South Kensington Museum for many years, was sold at auction. The Hope collection included the *saphire merveilleux* of Madame de Genlis's 'Tales of the Castle;' the King of Candy's cat's-eye, the largest known, having a diameter of an inch and a half; the Mexican sun-opal, carved with the head of the Mexican sun-god, and historically known since the sixteenth century; an enormous pearl, the largest known, weighing three ounces, and two inches in length; the aquamarine sword-hilt made for Murat, King of Naples; and also many curious diamonds, sapphires, emeralds, and several hundred unique and magnificent gems. Such a collection should be preserved intact as a national possession.

"In 1886 it was decided by the French Assembly that the crown jewels, with the exception of the famous 'Regent' diamond, two of the mazarines, and a few historic pieces reserved for the national museums, should be sold at public auction. These exceptions were made because it was feared that they would fall into the hands of Americans. The sale of this great historic collection took place in May, 1887. The 48 parcels were subdivided into 146 lots; and there were 68 buyers, 12 of whom bought over 1,000,000 francs' worth each. The largest lot, the great corsage, which sold for 811,000 francs, was purchased by a single American firm, the largest buyer at the sale. The purchases of the firm amounted to 2,249,600 francs, or about 34 per cent of the entire sum realized; while as to quality, the same firm obtained more than two-thirds of the finest gems. Among them were the three mazarines; a pear-shaped rose brilliant, weighing $24\frac{27}{32}$ carats, for 128,000 francs; a pear-shaped white brilliant, weighing $22\frac{1}{4}$ carats, for 81,000 francs; a white brilliant, weighing $28\frac{7}{16}$ carats, for 155,000 francs; and an oval brilliant, weighing $18\frac{1}{32}$ carats, for 71,000 francs; or 435,000 francs for the four. All but one of their purchases were secured by private American customers. The great interest attached to this sale was due not only to the fact that many of the gems were of very fine quality, but also to their historic associations. The history of many of them could be traced back several hundred years. In its way this sale did more than any thing that had before occurred to establish a reputation abroad for American taste, wealth, and enterprise.

"The collection of antique gems, numbering 331 pieces, formed by the Rev. C. W. King of Trinity College, England, the greatest of all writers on engraved gems, was sent to the United States for sale in 1881. This collection represents the keystone and the summing-up of Mr. King's vast knowledge, and none has ever been more thoroughly studied. His numerous writings mark an epoch in the study of this branch of archæology; and only the loss of his sight led him to part with his treasures. The growing interest and taste in archæological matters in the United States induced him to send it here to be sold intact. In October, 1881, through the friendly mediation of Mr. Feuardent, it was purchased, and presented to the Metropolitan Museum of Art, by Mr. John Taylor Johnson, then president of the museum, where it has since reposed.

"Near it will be placed the Somerville collection. Mr. Somerville, a Virginian by birth, and a gentleman of fortune and artistic tastes, while spending the past thirty-two years of his life in Europe, Asia, and Africa, has collected cameos, intaglios, seals, and other historical gems; and, as a result of his liberal expenditure of time and money, he is to-day the owner of one of the most unique and valuable collections of engraved gems in the world, numbering over 1,500 specimens, including Egyptian, Persian, Babylonian, Etruscan, Greek, Roman, Aztec, and Mexican glyptic or jewel-carving art. All of these are represented by specimens of singular excellence, affording us a panoramic view of the achievements of civilized man in this direction. This remarkable collection, now at his home in Philadelphia, has been loaned to the Metropolitan Museum of Art, New York, where it will soon be placed on exhibition, and the public will be afforded every facility to study the beautiful achievements of the glyptic art.

"Of greater antiquity and archæologic value, because representing a period before gems were cut in the form of intaglios, is the collection of the Rev. W. Hayes Ward, consisting of 300 Babylonian, Persian, and other cylinders. Two hundred of these he himself collected in Babylon and its vicinity, and sold to the museum at a nominal figure. Since that time he has collected 100 more cylinders. Many of them date from 2500 B.C. to 300 B.C., and are cut in lapis lazuli, agate, carnelian, hematite, chalcedony, jasper, sard, etc.

"The death of Dr. Isaac Lea of Philadelphia, which occurred Dec. 19, 1886, in his ninety-fifth year, robbed the world of a great investigator in the field of precious stones. During the last twenty years of his exceptionally long and useful life, he devoted almost his entire time to studying the microscopic inclusions in gems and minerals; and the cabinet he left contains thousands of specimens of rubies, sapphires, chrysoberyls, tourmalines, garnets, quartz, etc., all of which he had subjected to the most rigid microscopic scrutiny, noting every interesting fact on the accompanying label. Only a small part of his work on this highly interesting subject has been published by the Philadelphia Academy of Sciences, in two papers (in 1869 and 1876), but Dr. Lea made ample provision in his will for the publication of the remainder. His extensive collections of minerals and shells were bequeathed to the National Museum; and the gem-collection, to his daughter, Miss Lea. Two months before his death, I spent two hours with him, examining a series of quartz inclusions, over which he worked with all the enthusiasm and brightness of youth.

"One of the many benefits traceable to the New Orleans Exhibition was the appropriation given to the National Museum for their exhibit. This was wisely expended by Prof. F. W. Clarke in the purchase of a complete series of precious stones, many of which, although not expensive, are still the finest in the United States, from an educational standpoint. Since the exposition many fine specimens have been added by purchase and donation, especially the diamonds and pearls presented by the Iman of Muscat to President Buchanan, consisting of 138 diamonds and 150 pearls, all of good quality. The collection numbers about 1,000 specimens, and embraces almost every known variety of precious stone, many of them in very fine examples."

A Proposed Steel 'Vacuum' Balloon.

The committee of the House of Representatives on acoustics and ventilation has actually reported favorably a bill appropriating seventy-five thousand dollars to subsidize a man who thinks he can construct a steel 'vacuum' balloon of great power. He is to be allowed to use the facilities of one of the navy-yards for the building of his machine, and is to have the money as soon as he has expended seventy-five thousand dollars of private capital upon his air-ship.

One of the mathematical physicists of Washington was asked by a member of Congress whether such a balloon could be successfully floated. He set to work upon the problem, and here are some of his results, which are rather curious: —

A common balloon is filled with hydrogen-gas, which, being lighter than air, causes the balloon to rise and take up a load with it. But, as the pressure of the gas within is equal to the pressure

of the atmosphere without, no provision other than a moderately strong silk bag is required to prevent collapse. The inventor of the proposed steel balloon hopes to gain greater lifting-power by using a vacuum instead of gas, the absence of substance of any kind being lighter than even hydrogen-gas. But he has to contend with the tendency of the shell to collapse from the enormous pressure of the atmosphere on the outside, which would not be counterbalanced by any thing inside of it.

The first question which presented itself was, how thick could the metal of the shell be made, so that the buoyancy of the sphere, which would be the most economical and the strongest form in which it could be constructed, would just float it without lifting any load? The computations showed that the thickness of the metal might be .000055 of the radius of the shell. For example: if the spherical shell was one hundred feet in diameter, the thickness of the metal composing it could not be more than one-thirtieth of an inch, provided it had no braces. If it was thicker, it would be too heavy to float. Now, if it had no tendency to buckle, which of course it would, the strength of the steel would have to be equivalent to a resistance of more than 130,000 pounds to a square inch to resist absolute crushing from the pressure of the air on a cross-section of the metal. Steel of such high crushing-strength is not ductile, and cannot be made into such a shell. If the balloon is to be braced inside, as the inventor suggests, just as much metal as would be used in constructing the braces would have to be subtracted from the thickness of that composing the shell. Of course, such a shell would buckle long before the thickness of the metal of which it was composed was reduced to .000055 of its radius. In other words, it is mathematically demonstrated that no steel vacuum balloon could be constructed which could raise even its own weight.

This is an illustration of how intelligently Congress would be likely to legislate on scientific matters unguided by intelligent scientific advice.

Death of Prof. E. B. Elliott.

Prof. E. B. Elliott, actuary of the Treasury Department, died suddenly of heart-disease on Thursday, May 24. He was nearly sixty-five years of age, and had been in the employ of the government since 1861. Professor Elliott was born in Sweden, Monroe County, N.Y., was graduated from Hamilton College, and, after teaching, became interested in the early development of telegraphy, — an interest which he retained as long as he lived. His great skill in making computations led him later to become the actuary of a life-insurance company in Boston, which position he filled until called to a similar office in the United States Sanitary Commission, in 1861.

In 1865 he was secretary of the commission for revising the United States revenue laws, and in 1871 entered the Civil-Service Reform Commission. His service as actuary of the Treasury Department has covered a great amount of statistical and computation work, which has been of the greatest value both to the government and to Congress. Professor Elliott was a member of the American Association for the Advancement of Science, of which he was chosen one of the vice-presidents in 1882. He was always very active, and presided over the section of economic science and statistics. He was also a member of the Washington Philosophical Society, and, at a meeting reviewing the work of the last ten years, it was reported that he had presented more papers to that society in that period than any other member. He was a member of the Cosmos Club and of many foreign learned societies.

He has published a great number of papers on mathematical physics and statistics, and in 1863 was a member of the International Statistical Congress in Berlin. He was greatly interested in horology, and an active member of the American Horological Society. At the time of his death he was engaged upon some important original investigations in that line. He was the first to have a clock constructed with hands to indicate standard time in the different divisions of this continent, long before any one hoped that it would be so generally adopted in the United States.

Professor Elliott prepared the tables of weights and measures in the appendix of Webster's 'Counting-House Dictionary,' and also those constructed on the metric system. He made his greatest reputation by his many valuable statistical reports on coinage, weights and measures, and on bonds. Some of these were published in the last 'United States Census Report,' especially in the volume on vital statistics. He was a very genial and companionable man, rather contemplative, weighing carefully every new fact brought to his attention, and striving to foresee its effects. He will be greatly missed in Washington, and it will be very difficult to fill his place.

The Tape-Worm in Sheep.

Over eighty-five per cent of the sheep examined in Colorado last summer, according to a report made by Dr. Cooper Curtice to the Biological Society at a recent meeting, were infected by a tape-worm which is apparently indigenous to the Western country. Similar parasites had been described in 1856 by Dr. K. M. Diesing from specimens obtained by Natesen from Brazilian deer; but since that time the species was apparently unnoticed. This species is interesting, first, on account of its peculiar anatomy and the life-history of the individual parasite; second, because of the history of this species, which indicates it to be the first acquisition of a native parasite by the sheep on this continent, and its subsequent distribution in the United States; and, third, from an economic standpoint, the discussion of it including a consideration of the disease produced in sheep — the actual loss in death-rate, in wool and mutton, due to the parasite — and of the problem of cure and prevention of the disease.

After describing the parasite, Dr. Curtice said that these tænia occur in the duodenum and gall-ducts of Western lambs and sheep. They sometimes fill each. So tightly do they pack the gall-duct at times, that they cannot be withdrawn without breaking them, and the duct itself is distended by them. The smallest tænia, about half a centimetre long, are always found in the duodenum. They may be found from May to January: no observations were made in the winter months. From the duodenum they pass into the gall-duct, and occasionally into the pancreatic duct. The tænia are usually found in assorted sizes, from the young to the adult, but all may be nearly equal in size. From observations made upon a great number of lambs, it seems that these parasites cannot mature in less than six, or possibly ten months; so that the tænia in lambs would not be capable of infecting other lambs until the former became yearlings. No stages intermediate between the embryo escaping from the parent segment and the tænia five millimetres long were found.

As this species has not been described in Europe, and has not been noticed in eastern United States, it seems to have been acquired by the sheep since their importation into this country. Spanish sheep were first imported about 1820. From the early importation of sheep into Mexico and lower California arose those immense herds of mission sheep, and eventually the millions of sheep now found in the West. These sheep are rapidly being interbred with better grades of Eastern sheep; but the Mexican sheep furnished the material with which the sheep-men of the Plains began. The history of the acquisition and distribution of this parasite is believed, then, to be coincident with the history of these sheep since their arrival in this country. This parasite, originally affecting deer on this continent, is believed by Dr. Curtice to have become ingrafted into sheep, animals with similar life-habits, and, through the favorable conditions of ranching, to have spread rapidly with the increase of the flocks. Its distribution is now from Oregon and Wyoming southward, and Nebraska and Kansas westward.

The disease they cause in sheep makes its appearance gradually, and increases as the parasites grow. It is characterized by a hide-bound, tucked-up condition of the lambs, which is indicative of lean, ill-conditioned animals. Sheep may be apparently strong and healthy, and still harbor a number of these parasites. The poorer lambs generally die from exposure to inclement weather, or from smothering by piling on top of each other in storms in their endeavors to keep warm. The actual loss by death among the lambs is probably the least portion of it; that occasioned by the diminished amount of fat, muscle, and wool, which, though small for each animal, is constantly present from year to year, forms the larger, and aggregates a total loss to the sheep-husbandry of the Plains which is probably greater than that due to the scab-insect.

As yet no effective medicinal remedy for the destruction of these parasites has been discovered. Something may be done in the way of prevention; but, until the complete life-history of the tænia is

known, an entirely satisfactory plan of prevention cannot be proposed. At present, watering from troughs instead of from prairie pools, pasturing the lambs on prairie not recently pastured on by older sheep, and, after weaning, removing them to fresh pastures, are recommended. The practice of winter feeding on grain and hay undertaken by ranchmen is especially advisable in keeping up the health of infected animals.

ELECTRICAL SCIENCE.

Long-Distance Telephone-Lines.

IT is known that there is considerable difficulty in transmitting speech by telephones over long distances, unless special precautions are taken in the construction of the lines. Dr. Wietlisbach has investigated the best conditions for telephone-lines, and has arrived at the following laws for the effect of the disturbing causes: —

1. The greater the resistance and leakage, the smaller is the strength of the received current.
2. Self-induction favors high notes.
3. Capacity favors low notes.
4. The resistance diminishes the effect of self-induction, and increases the effect of capacity.
5. Leakage diminishes the effect of capacity, and increases that of self-induction.
6. In a conductor having both self-induction and capacity, the relative intensity of the undulations increases and decreases periodically with the rise in the height of the note.
7. The magnetic permeability and the polarization of the conductor destroy the clearness of the transmission.

If all of the factors remained constant, it would be possible to design a line in which the relations between capacity, self-induction, resistance, etc., were such that all notes would be transmitted with equal clearness. For example: in a submarine cable where the capacity is great, a man's voice is heard farther and more distinctly than a woman's, since capacity favors low notes as compared with high notes; but it would be possible to so increase the self-induction of the line that both would be heard with equal distinctness, and at the same time both would be more perfectly reproduced, since all of the tones would be given their proper relative values.

Unfortunately this cannot be readily done in practice, since the leakage, which diminishes the effect of capacity and increases that of self-induction, is in most lines a quantity which varies with the state of the weather. Dr. Wietlisbach thinks, therefore, that the best way to build a line is to make all of the effects as small as possible, using a looped circuit of copper wire of low resistance and capacity. The empirical rule used in practice is to make the product of the resistance and capacity of any line less than a certain constant which has been determined by experiment. One would suppose, however, that, by roughly adjusting the capacity and self-induction of the line, much clearer speech would result.

POSSIBILITIES AND LIMITATIONS OF CHEMICAL GENERATORS OF ELECTRICITY. — Mr. Francis B. Crocker read a paper before the American Institute of Electrical Engineers with the above title, which cannot fail to be of interest at the present time; more especially as primary-battery schemes seem about to invade this country from what has been until now their home, England. Mr. Crocker first gives the ordinary formula for calculating the electro-motive force from the energy of chemical combinations that go on, — $E = 4.16\ aH$, "where E is the electro-motive force, a the electro-chemical equivalent (grams per coulomb), and H is the number of heat-units (gram-degrees) produced per gram of material by the given combination." It should be pointed out here that this formula is slightly inaccurate, as has been shown by Willard Gibbs and Helmholtz. Gibbs gives it as (putting in the above form) $E = 4.16\ aH \frac{T_0 - T}{T_0}$, where T is the temperature of dissociation, and T the temperature of the cell. We would expect, then, that the electro-motive forces obtained from experiment, and those calculated from the uncorrected formula, would be slightly different, the latter being slightly higher. The following table is interesting: —

Metal.	Combining with Chlorine.		Bromine.		Iodine.	
	Calculated.	Determined.	Calculated.	Determined.	Calculated.	Determined.
Magnesium	3.24	3 10	—	—	—	—
Zinc	2.09	2 11	1.63	1.79(?)	1.05	1 25
Cadmium	2.00	1.90	1 58	1.58	.97	1.12
Aluminium	2.30	2.00	1.70	1.53	1.00	.88
Iron	1.75	1 60	1.50	1.30	85	.68
Cobalt	1.64	1.43	—	—	—	—
Nickel	1.57	1 33	—	—	—	—
Tin	1.71	1.61	1.50	1 30	—	—
Lead	1.76	1.63	1.38	1.33	.85	.83
Copper	1.40	1.32	1.07	1.02	.69	.64
Silver	1.25	1.11	.97	.95	.59	.65
Antimony	1.30	1.22	—	—	—	—
Bismuth	1.30	1 21	—	—	—	—

The table of costs is, however, really important, especially to investors. In the table there is given opposite each substance the amount consumed and the cost for a horse-power hour. To find the total cost of a cell, the sum of the costs of its constituents should be taken. These cells all employ zinc as the positive element.

Material: Zinc used with following Electro-Negative or Depolarizing Elements.	Electro-motive Force produced.	Weight of Zinc consumed per Horse-Power Hour.	Weight of Depolarizer consumed.	Total Cost of both Positive and Negative Material per Horse-Power Hour (Zinc costs 7 cents per Pound).
	Volts.	Pounds.	Pounds.	
Free iodine	1.200	1.67	6.53	$22.97
Free bromine	1.790	1.12	2 76	1.12
Free chlorine	2.110	.95	1 04	—
Free oxygen	1.900	1.05	.26	—
Free sulphur	.950	2.10	1.03	.17
Chemical Compounds.				
Water	.500	4.00	1.10	—
Nitric acid	1 900	1.05	2.04	.20
Chromic acid	2 000	1.00	1.03	.28
Copper sulphate (anhyd.)	1.079	1.86	4.55	—
" " crystals	1.079	1.86	7.13	.56
Iron perchloride	1.550	1.30	6.50	.74
Silver chloride	1.060	1.89	8.32	133 25
Mercury sulphate	1 420	1.41	10.70	5 45
Mixtures.				
Potassium bichromate (3 parts) Sulphuric acid (7 parts)	2.000	1.00	5.08	.27
Potassium bichromate (3 parts) Sulphuric acid (4 parts)	2.000	1.00	7.04	.42

In this table the products of the action are not taken into account. In some cases these products would be of considerable value, as